ADLINK TECHNOLOGY INC.

Matrix MXC-4000 Series

User's Manual

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Advance Technologies; Automate the World.

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Preface

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1 Introduction

1.1 Overview

The Matrix MXC-4000 series is a fanless, embedded computer based on the next generation Intel® Atom™ D510 dual-core processor to offer greater computing power for your applications. The MXC-4000 inherits its exceptional fanless and cable-less design from existing Matrix C series, with the addition of innovative features, such as an eSATA interface, an LVDS output, and a hot-pluggable fan option.

The MXC-4000 series features an Intel® Atom™ D510 dual-core1.6 GHz processor to boostits performance to almost twice that of the Atom™ N270 platform, while maintaining the same overall power consumption. Its PCI and PCIe slots give you the possibility to integrate off-the-shelf PCI/PCIe cards and develop a configurable application platform. Built-in isolated DIO channels are provided for general industrial control. Its LVDS output on the front panel allows you to directly connect to a LCD panel. The MXC-4000 series also provides two eSATA ports to enable the capability of either expanding storage capacity or using hot-swappable SATA drives.

Leveraging a reliable fanless and durable cable-less design, the MXC-4000 series exhibits excellent dependability in harsh environments, where severe temperature variation and vibration may exist.

The MXC-4000 series provides an optional hot-pluggable fan module to dissipate heat generated within the system when high power consumption PCI/PCIe cards are installed. This ingenious mechanical design retains a cable-less structure which dramatically improves thermal stability when PCI/PCIe cards installed. Combining a reliable design with more computing power and innovative features, the Matrix MXC-4000 series is the optimal choice to base your rugged application system on.

1.2 Specifications

Model Name	MXC-4002D	MXC-4011D
System Core		
Processor	Intel® Atom™ D510 1.66 GHz Dual-Core CPU	
Chipset	Intel® I/O Controller Hub 8 Mobile (ICH8-M)	
Video	VGA+LVDS display via DVI-D connector - Analog CRT, supports QXGA (2048 x 1536) resolution - 18-bit LVDS output via DVI-D connector for LCD panel	
Memory	1 GB DDR2 667 MHz SODIMM module	
I/O Interface		
Expansion Slots	2 PCI slots	1 x1 PCIe slot + 1 PCI slot
Ethernet	2x GbE Ports (Intel® 82574L)	
DI/O	12 DI + 12 DO	
Serial Port	2x software-programmable RS-232/422/485 (COM1 & COM2) 2x RS-232 (COM3 & COM4)	
USB	4x USB 2.0 Ports	
Audio	1x Mic-in and 1x Speaker-out	
KB/MS	1x PS/2 Keyboard and 1x PS/2 Mouse	
Power Supply		
DC Input	Built-in 9-32 V DC Input with Over-voltage Protection 3P Pluggable Connector with Latch (GND, V-, V+)	
AC Input	Optional 80 W external AC-DC adapter for AC input	
Storage Devices		
SATA HDD	On-board SATA Port for 2.5" HDD/SSD Installation	
eSTATA	2x eSATA interface connectors for external storage expansion	
Compact-Flash	1x type II CompactFlash socket, supporting PIO and DMA modes	
Mechanical		
Fan	Optional, hot-pluggable fan module for dissipating heat generated by PCI/PCIe card	
Dimension	118 mm (W) x 219 mm (D) x 183 mm (H)	

Table 1-1: Specifications

Weight	2.8 kg (6.16 lbs)
Mounting	Wall-mount kit
Environmental	
Operating Temperature	w/o FAN, w/o Card and w/o HDD: -10°C to 60°C
Storage Temperature	-40°C to 85°C
Humidity	~95% @ 40°C (non-condensing)
Vibration	Operating, 5 Grms, 5-500 Hz, 3 Axes (w/CF or SSD) Operating, 0.5 Grms, 5-500 Hz, 3 Axes (w/HDD)
Shock	Operating, 50 Grms, Half-sine 11 ms duration (w/CF or SSD)
Power Consumption (w/ 24 V DC supply)	0.72 W (Power Off), 12.96 W (System Idle), 35.04 W (System Full Load)

Table 1-1: Specifications

1.3 Unpacking Checklist

Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform your dealer immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from your dealer before returning any product to ADLINK.

Check if the following items are included in the package.

MXC-4000

- MXC-4000 controller
- Wall-mount bracket
- Screw pack for the wall-mounting and HDD
- User's manual
- ADLINK All-in-One DVD

Note: The package contents of OEM versions may vary depending on customer requests. The assigned controller and/or peripheral modules may be pre-installed and shipped with the chassis. Inquire with your dealer for additional information on these options.

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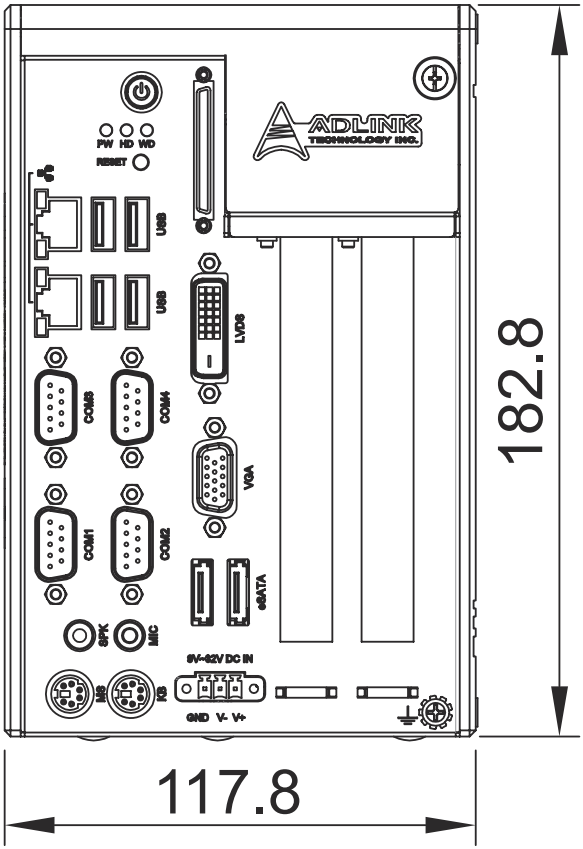
2 System Description

This section describes the appearance and connectors of the MXC-4000 controller, including chassis dimension, front panel connectors, and internal IO connectors.

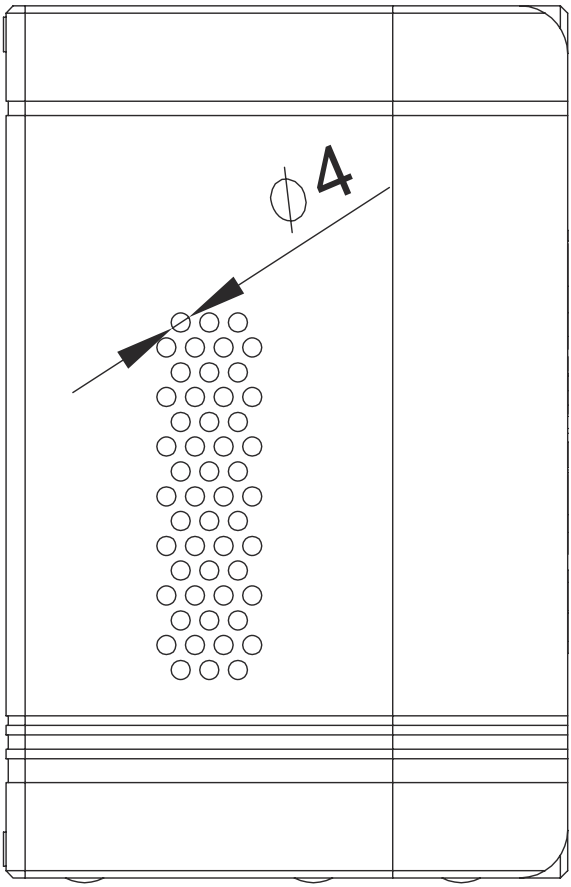
2.1 Mechanical Drawings

All dimensions shown are in mm.

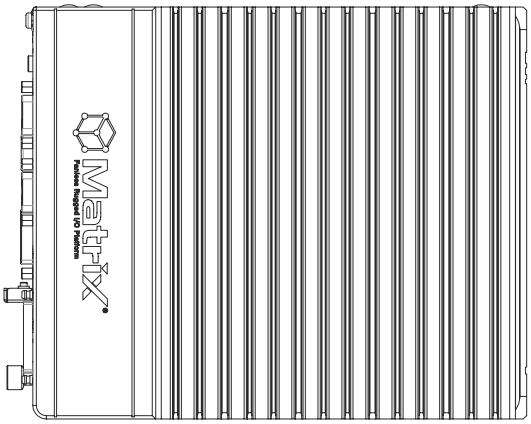
2.1.1 Front View



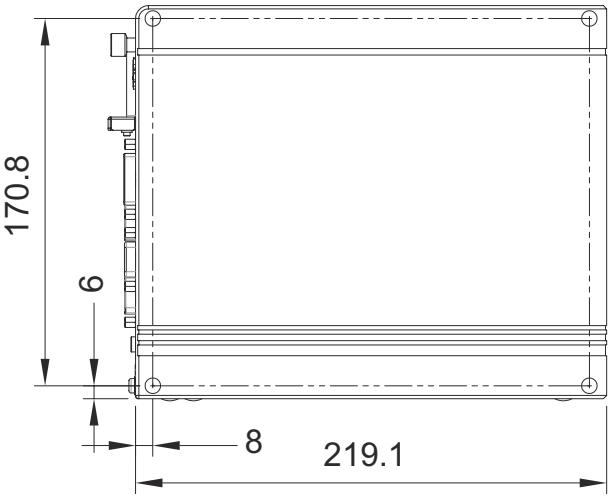
2.1.2 Rear View



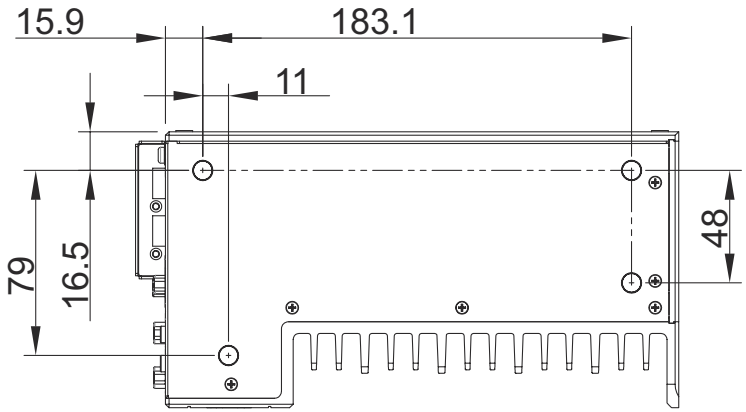
2.1.3 Side View (Left)



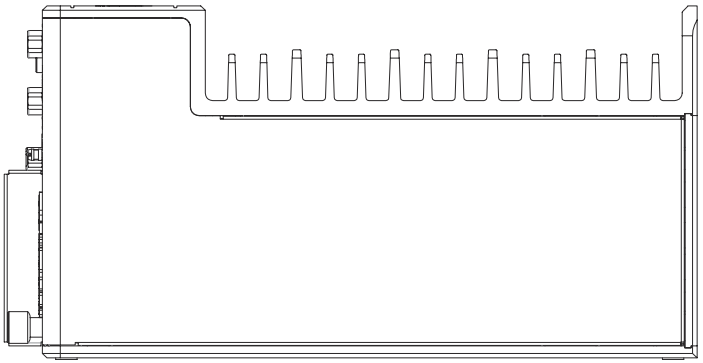
2.1.4 Side View (Right)



2.1.5 Bottom View

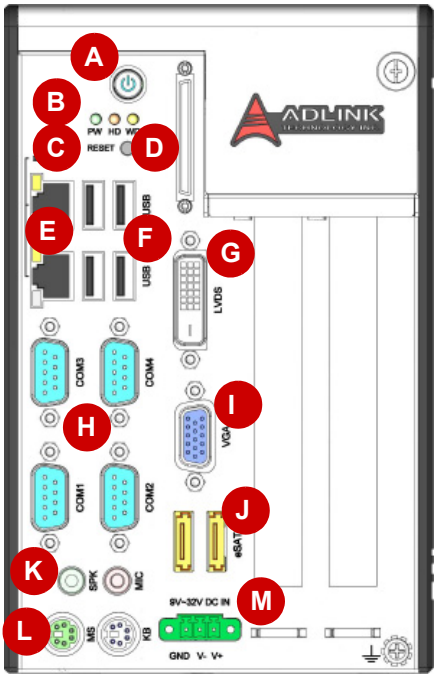


2.1.6 Top View



2.2 Front Panel I/O Connectors

The MXC-4002D/4011D controller has the same I/O connector configuration on the front panel. This section describes functions of these I/O connectors.



Symbol	Function	Symbol	Function
A	Power button	H	COM ports
B	LED indicators	I	VGA connector
C	Reset button	J	eSATA ports
D	Digital I/O connector	K	Audio jacks
E	Dual Gigabit Ethernet ports	L	PS2 keyboard & mouse
F	USB2.0 ports	M	DC power input connector
G	LVDS Connector		

Table 2-1: MXC-4002D/4011D Connectors

2.2.1 Power Button

The power button is a non-latched push button with a blue LED indicator. The system is turned on when button is pressed, and the power LED is also illuminated. To shut down the system, you can issue shutdown command via the operating system or just press the power button. If the system halts, you can also press the button for 5 seconds to force system shutdown.

2.2.2 LED Indicators

There are three LED indicators on the front panel. The following table describes the color and function of the LED indicators.

LED indicator	Color	Description
Watchdog (WD)	Yellow	Indicates the status of watchdog timer. When the watchdog timer is started, the LED is flashing. And when the timer is expired, the LED is on.
Hard disk drive (HD)	Orange	Indicates tthe operating state of HDD. When the SATA hard drive or internal CF card is active, the LED indicator is flashing.
Power LED (PW)	Green	Indicates the status of the power. When the power is presed, the LED will be on.

Table 2-2: LED Indicators

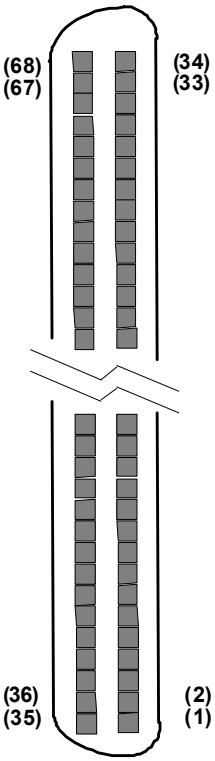
2.2.3 Reset Button

The reset button is used to perform a hard reset of the MXC-4002D/4011D controller.

2.2.4 Digital I/O Connector

The MXC-4002D/4011D controller features on-board isolated digital I/O circuit and has a 68-pin VHDCI (Very High Density Cable Interconnect) connector on the front panel. The on-board digital I/O card supports the following features:

- 12-CH Isolated DI
  - Logic high: 5 to 24 V
  - Logic low: 0 to 1.5 V
  - Input resistance: 2.4 k @ 0.5 W
  - Isolation voltage: 1000 V_{RMS}
- 12-CH Isolated DO
  - Output Type: open drain power MOSFET driver
  - 250 mA for all channels @ 60°C, 100% duty
  - Supply voltage: 5 to 35 V_{DC}
  - Isolation voltage: 1000 V_{RMS}
  - Data transfers: programmed I/O



(1) VDD	(24) IDI_1L	(47) EOGND
(2) EOGND	(25) IDI_0H	(48) IDO_10
(3) IDO_7	(26) IDI_0L	(49) EOGND
(4) EOGND	(27) IDI_11	(50) IDO_9
(5) IDO_6	(28) IGND	(51) EOGND
(6) EOGND	(29) IDI_10	(52) IDO_8
(7) IDO_5	(30) IGND	(53) IDI_7H
(8) EOGND	(31) IDI_9	(54) IDI_7L
(9) IDO_4	(32) IGND	(55) IDI_6H
(10) EOGND	(33) IDI_8	(56) IDI_6L
(11) IDO_3	(34) IGND	(57) IDI_5H
(12) EOGND	(35) VDD	(58) IDI_5L
(13) IDO_2	(36) ISO5V	(59) IDI_4H
(14) EOGND	(37) EOGND	(60) IDI_4L
(15) IDO_1	(38) NC	(61) NC
(16) EOGND	(39) EOGND	(62) IGND
(17) IDO_0	(40) NC	(63) NC
(18) EOGND	(41) EOGND	(64) IGND
(19) IDI_3H	(42) NC	(65) NC
(20) IDI_3L	(43) EOGND	(66) IGND
(21) IDI_2H	(44) NC	(67) NC
(22) IDI_2L	(45) EOGND	(68) IGND
(23) IDI_1H	(46) IDO_11	

Table 2-3: Digital I/O Connector

Legend:

- IDI_n: Isolated digital input channel #n.
- IDO_n: Isolated digital output channel #n.
- IDI_nH: High input of isolated differential DI channel #n.
- IDI_nL: Low input of isolated differential DI channel #n.
- EOGND: Ground return path of isolated output channels.
- VDD: Power input signal for fly-wheel diode of DO channels.

2.3 Operating Principles

2.3.1 Isolated Digital Input

Isolated digital input utilizes an open collector transistor structure, with input voltage range of 0 V to 24 V and input resistance of 2.4K Ω. Connection between external signals and the MXC-4002D/ 4011D controller is as shown.

Note: The common input junction can be common ground or common power, based on the applied environment, such that digital input can be either a current source or current sink.

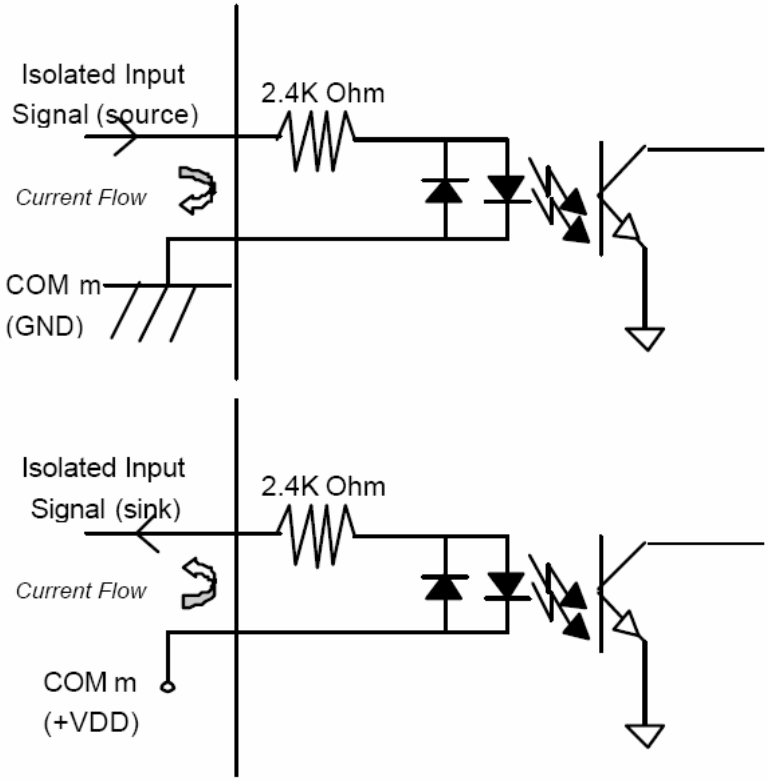


Figure 2-1: Isolated Input Connection

2.3.2 Isolated digital Output

Common ground connection of isolated digital output and common power connection of isolated digital output are shown.

When isolated digital output enters an "ON" state, sink current is conducted through the transistors. When an "OFF" state is entered, there is no current through the transistors.

Note: When the load is of an "inductance nature" such as a relay, coil or motor, the VDD pin must be connected to an external power source, with the extra connection utilized for the 'fly-wheel diode' to form a current-release closed loop, by which the transistors are protected from high reverse voltage generated by the inductance load when the output is switched from "ON" to "OFF".

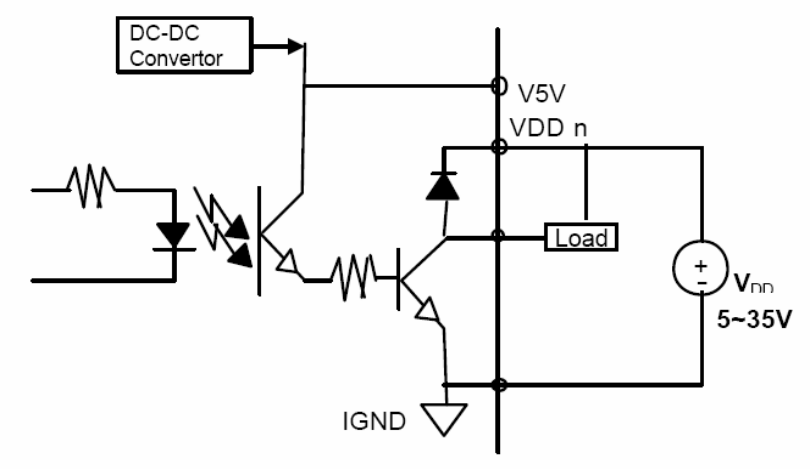


Figure 2-2: Common Ground Connection

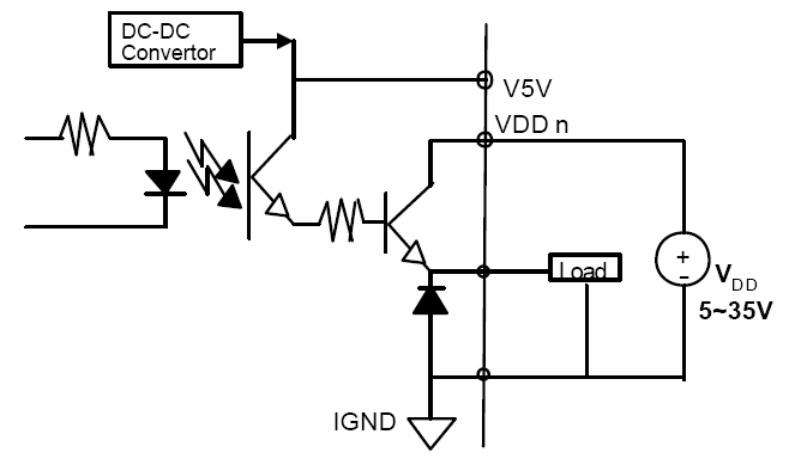


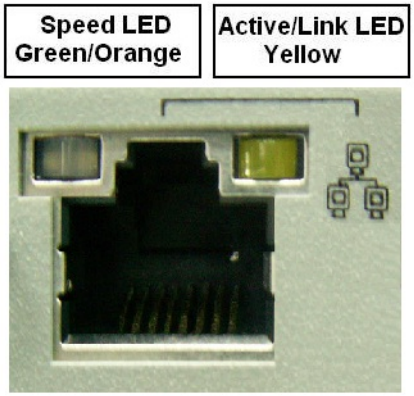
Figure 2-3: Common Power Connection

2.4 Gigabit Ethernet (WG82574L)

The MXC-4002D/4011D controller has two GbE ports on the front panel by Intel WG82574L Gigabit Ethernet controller.

The Ethernet controller supports the following features:

- x1 PCI Express® interface with 2.5 GHz signaling
- PCIe* advanced extensions
- Message signaled interrupts
- TCP Segmentation/Transmit Segmentation Offloading (TSO) support
- IEEE 802.3x and 802.3z compliant flow control support
- IEEE 802.1q support
- Compliant with 1 Gb/s Ethernet IEEE 802.3x PHY specifications
- Automatic MDI/MDIX crossover at all speeds
- ACPI 2.0 specification
- Full wake-up support
- Fully integrated ASF 2.0 functionality with on-chip µc
- SMBus 2.0 master interface for ASF functionality
- Preboot eXecution Environment (PXE) flash interface support



Active/Link LED

LED Color	Status	Description
Yellow	Off	Ethernet port is disconnected
	ON	Ethernet port is connected and no data transmission
	Flashing	Ethernet port is connected and is transmitting/receiving data.

Table 2-4: Active/Link LED

Speed LED

LED Color	Status	Description
Green/Orange	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

Table 2-5: Speed LED

2.4.1 USB 2.0 connectors

The MXC-4002D/4011D controller provides four USB 2.0 ports in Type A USB connectors on the front panel. All USB ports are compatible with high-speed, full-speed and low-speed USB devices. The MXC-4000 series supports multiple boot devices, including USB flash drive, USB external hard drive, USB floppy, USB CD-ROM and etc. The boot priority and boot device can be configured in BIOS. Please refer to section 4.1.5 for details.

2.4.2 LVDS Connector

The MXC-4002D/4011D controller provides LCD panel function in the LVDS connector on the front panel.

The MXC-4000 series supports only 18-bit one channel panel type.

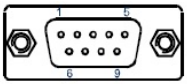
	1	C_LVD_A_DATA2_N	14	VCC_FPD
	2	C_LVD_A_DATA2_P	15	DGND
	3	DGND	16	C_LDDC_CLK
	4	C_LVD_EN	17	C_LVD_A_DATA0_N
	5	D12V_EXT	18	C_LVD_A_DATA0_P
	6	C_L_BRIGHTNESS	19	DGND
	7	C_LBKLT_EN_DELAY	20	C_LCD_PID1_R
	8	C_LDDC_DATA	21	C_LCD_PID0_R
	9	C_LVD_A_DATA1_N	22	DGND
	10	C_LVD_A_DATA1_P	23	C_LVD_A_CLK_P
	11	DGND	24	C_LVD_A_CLK_N
	12	C_DBL_CLK	25	CHGND
	13	DGND	26	CHGND

Figure 2-4: LVDS Connector

2.4.3 COM Ports

The MXC-4002D/4011D controller provides four COM ports in the form of D-Sub 9P connectors. COM1 and COM2 ports support RS-232/RS-422/RS-485 by BIOS selection, while COM3 and COM4 ports support RS-232 function only. Please refer to section

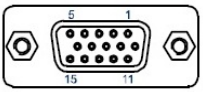
4.1.2.3 for the selection of setting RS-232/422/485 by BIOS of COM1 and COM2 ports.



PIN	Signal Name		
	RS-232	RS-422	RS-485
1	DCD#	TXD422-	485DATA-
2	RXD#	TXD422+	485DATA+
3	TXD#	RXD422+	
4	DTR#	RXD422-	
5	GND		
6	DSR#		
7	RTS#		
8	CTS#		
9	RI#		

2.4.4 VGA Connector

The D-sub 15-pin VGA connector is used to connect your MXC-4002D/4011D controller to a monitor. The MXC-4000 series supports only analog (VGA) monitors.

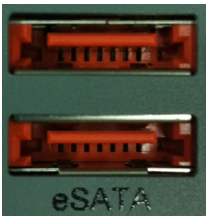


PIN	Signal Name
1	RED
2	GREEN
3	BLUE
4	NC
5	DGND
6	VGA_EN
7	DGND
8	DGND
9	VGAPWR
10	DGND
11	NC
12	SD_DATA
13	HSYNC_CN
14	VSYNC_CN
15	SD_CLK
16	CHGND
17	CHGND

Table 2-6: VGA Connector

2.4.5 E-SATA Connectors

The MXC-4002D/4011D controller has two E-SATA ports connectors on the front panel. The MXC-4000 series supports external storage expansion.



PIN	Signal Name
1	DGND
2	SATA1_TXP
3	SATA1_TXN
4	DGND
5	SATA1_RXN
6	SATA1_RXP
7	DGND
8	DGND
9	SATA2_TXP
10	SATA2_TXN
11	DGND
12	SATA2_RXN
13	SATA2_RXP
14	DGND
15	CHGND
16	CHGND
17	CHGND
18	CHGND

Table 2-7: E-SATA Connectors

2.4.6 Audio Jacks

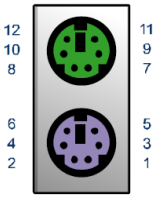
The MXC-4002D/4011D controller implements Intel High Definition audio using Realtek ALC262 chip. The HD audio supports up to 24-bit, 192 Kbps high quality headphone/speaker output and microphone input. Users can access the audio jacks on the front panel of MXC-4000 series. The pink jack is for microphone input, and the green jack is for speaker output.

Color	Signal Name
GREEN	LINE OUT
PINK	MIC IN

Table 2-8: Audio Jacks

2.4.7 Keyboard & Mouse PS2 Connectors

The MXC-4002D/4011D controller provides connectors for connecting PS2 keyboard and mouse. The green connector is for PS/2 mouse and the purple one is for PS/2 key-board.



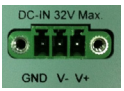
PIN	Signal Name
1	KBDATA
2	NC
3	DGND
4	KBVCC
5	KBCLK
6	NC
7	MSDATA
8	NC
9	DGND
10	KBVCC
11	MSCLK
12	NC

Table 2-9: Keyboard & Mouse PS2 Connectors

2.4.8 Power Input Connector

The DC power input connector of the MXC-4002D/4011D controller consists of three pins: V+, V- and chassis ground from right to left respectively. V+ and V- pins are for DC power input and chassis ground pin allows connect the chassis to ground for better EMC compatibility. The DC power input of MXC-4000 series allows a voltage input from 9 VDC to 32 VDC. The MXC-4000 series also features the under/over voltage input protection.

The system will automatically shut off when input voltage is too low (under 7.5 V) or too high (over 34 V).

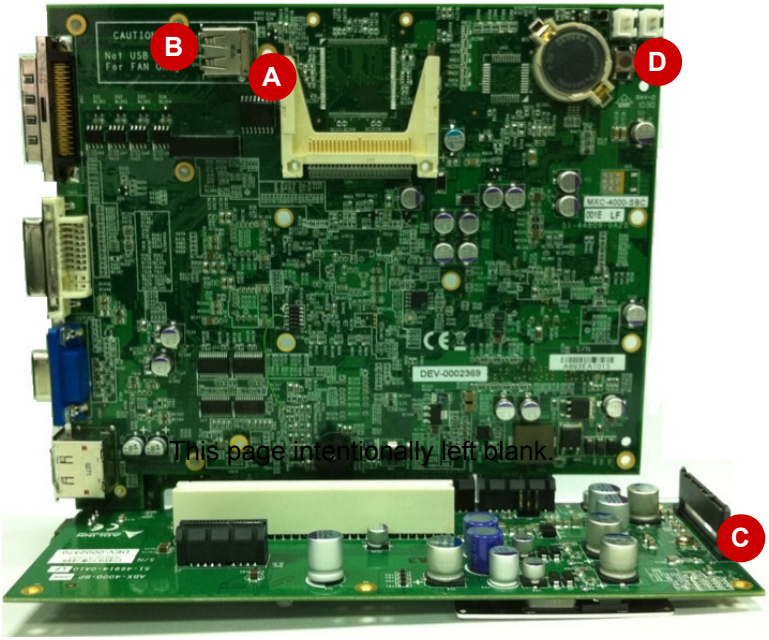


PIN	Signal Name
1	GND(CHGND)
2	V-(DGND)
3	V+(DC_IN)

Table 2-10: Power Input Connector

2.5 Internal I/O Connectors

The section describes the internal I/O connectors of the MXC-4000 series. MXC-4002D and MXC- 4011D have the same internal I/O connectors. The figure showed below is what's inside the MXC-4000 series.



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Symbol	Function
A	CompactFlash Socket
B	FAN connector
C	SATA connector
D	Clear CMOS button

Table 2-11: Internal I/O Connectors

2.5.1 CompactFlash Socket

The internal CompactFlash socket is connected to chipset via IDE interface, and can be used as an alternative storage device for system installation. If want to boot up the MXC-4002D/4011D controller via a CF card with OS installed. Due to the nature of IDE interface, the CF card is not hot-pluggable and must be installed before system power on. Please refer to section 3.3 for the illustration of installing a CF card.

2.5.2 Fan Connector

The MXC-4002D/4011D controller provides a insert the optional fan module by gently slide it into the fan connector.

PIN	Signal Name
1	D12V
2	FDO
3	PWM
4	GND

Table 2-12: Fan Connector

Note: This USB-like connector is **not** a USB port and is only for connecting the fan.

2.5.3 SATA Connector

The MXC-4002D/4011D controller provides a SATA Gen.1 port. The SATA host controller supports two modes of operation, the legacy mode using I/O space and AHCI mode using memory space. This SATA connector is designed for installing a 2.5" hard disk drive or solid state disk (SSD). The HDD or SSD must be installed into SATA connector with a specific bracket mounted on the chassis. Please refer to section 3.1 for the illustration of installing a 2.5" hard disk drive or SSD.

2.5.4 Clear CMOS Button

When encountering the abnormal condition that causes the MXC-4002D/4011D controller failed to boot, can try to clear the BIOS content stored in CMOS and restore to the default setting. To clear CMOS, just press the button and hold on for 1~2 second then release it. After doing that, the CMOS will restore to the factory default setting.

3 Getting Started

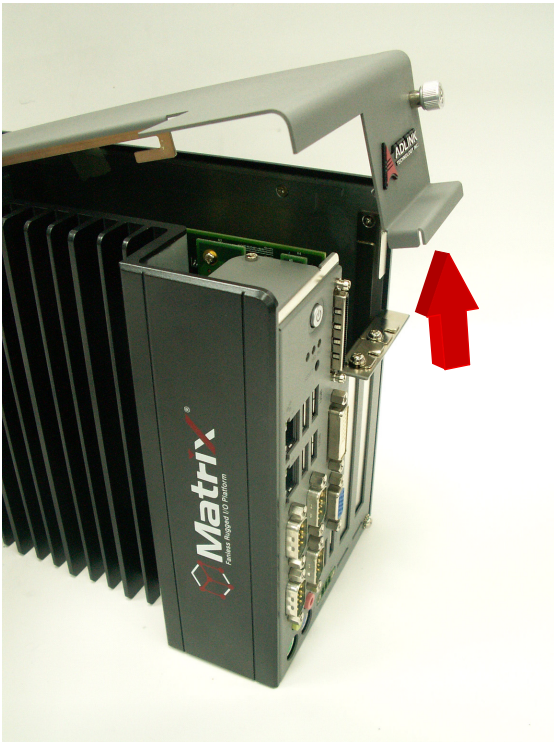
This chapter demonstrates how to install the hard disk drive, PCI/ PCIe card and CompactFlash card into system. Additional COM ports jumper settings and and the MXC-4000 series wall-mount installation are also discussed.

3.1 Installing a hard disk drive

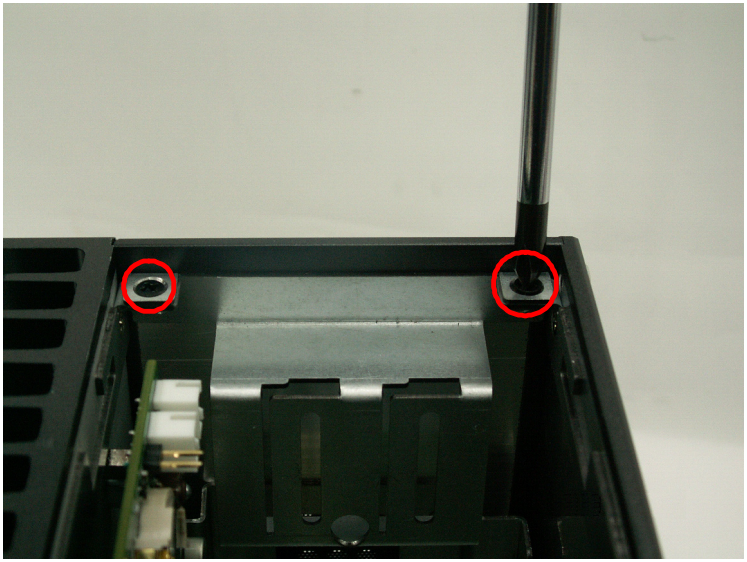
Before installing a hard disk drive, you should remove the top cover of chassis first. Please follow the instruction below.

1. Unscrew the screw on the front panel by hand or a screwdriver.

2. Hold the screw and pull it toward to your body side.

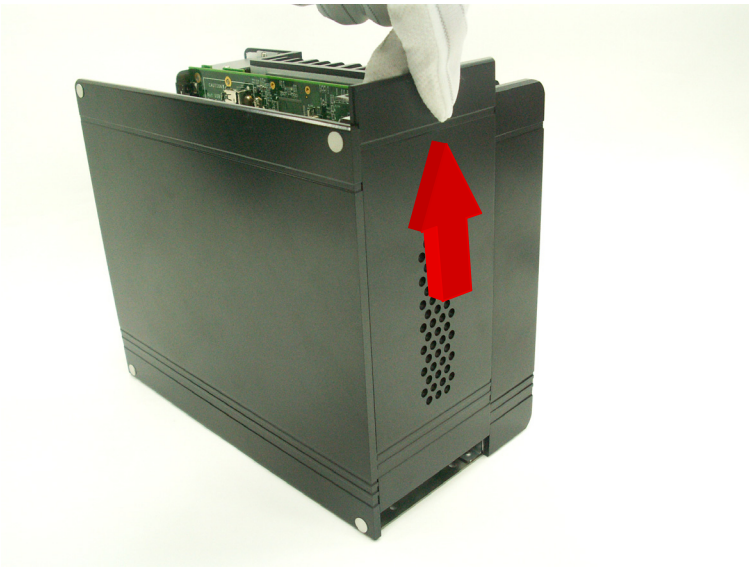


3. After removing the top cover, please use a screwdriver to unscrew two screws on the top side.

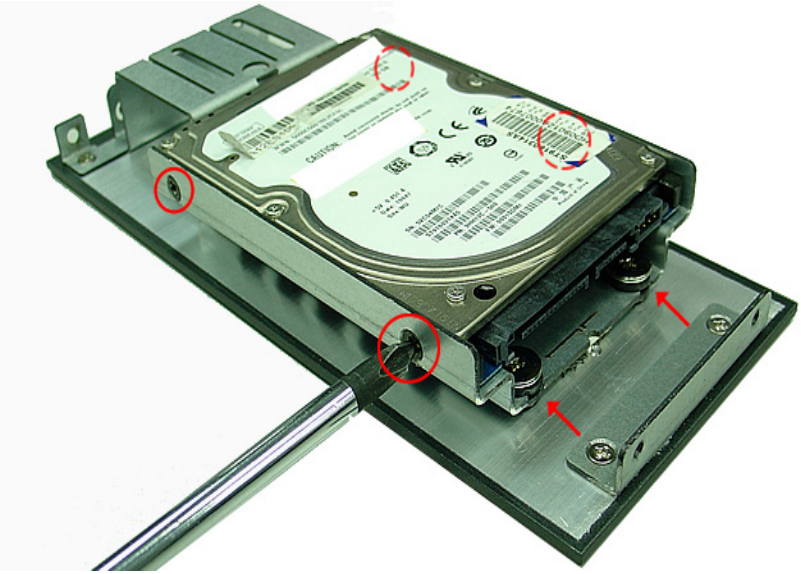


4. Place the chassis upside down and unscrew another two screws on the bottom side.

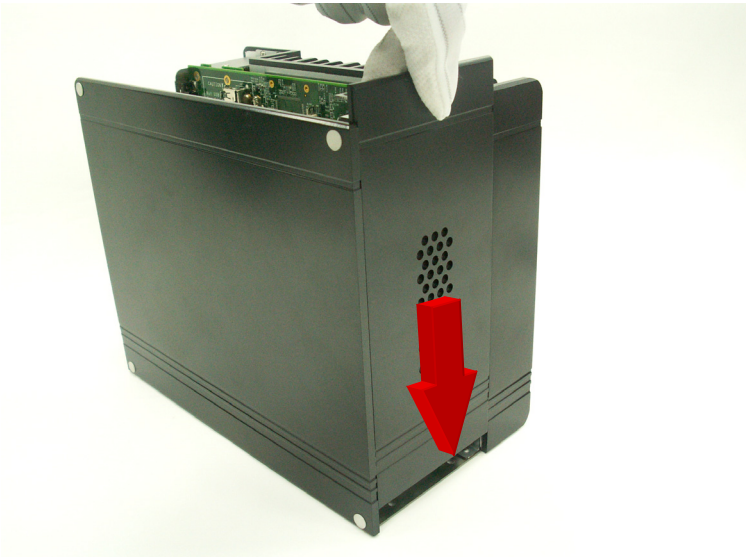
5. Pull the HDD bracket up.



6. Find the 4 M3 screws as accessories in the package. Fasten them to fix a 2.5" HDD or SSD to the bracket.



7. Gently push the HDD/SSD bracket down to the SATA connector on the PCB.

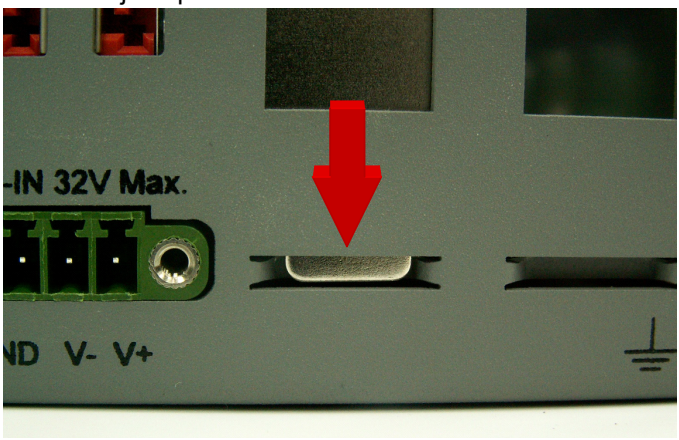


8. Reverse Step 3 and 4 to fasten the 4 screws.
9. Put the top cover back, and then fasten the thumbscrew.

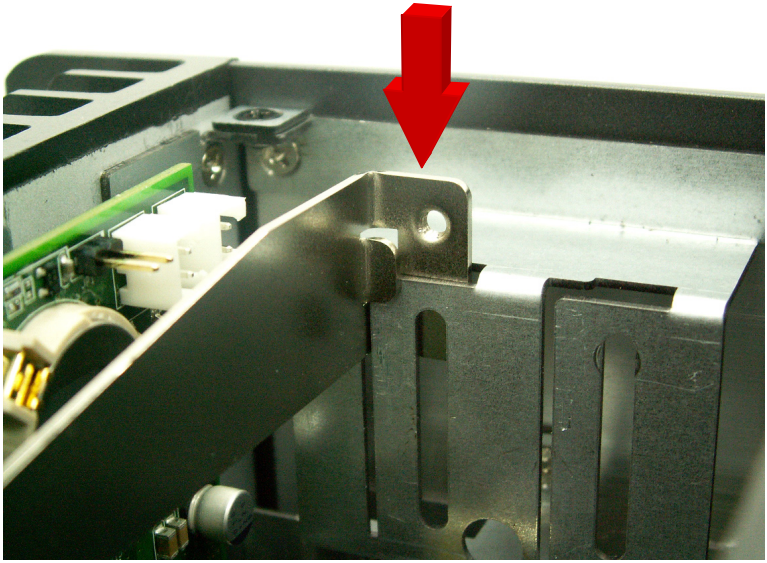
3.2 Installing PCI/PCIe card

Please follow steps 1-2 in section 3.1 to remove the top cover before installing a PCI/PCIe card.

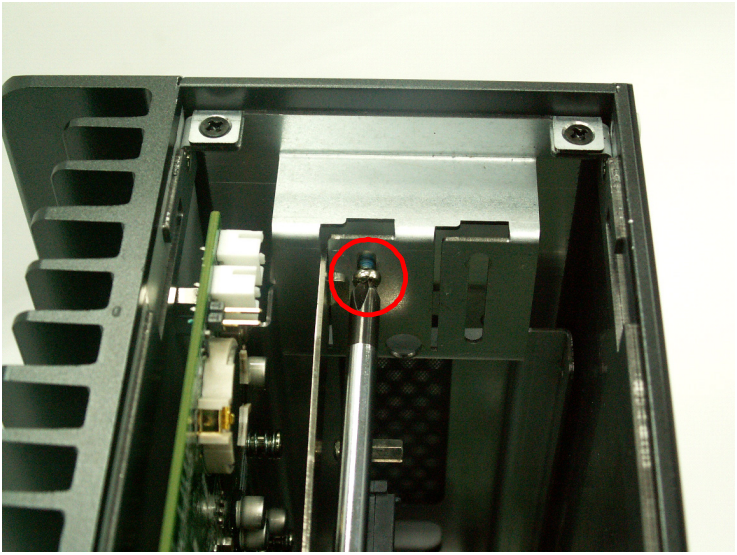
1. Insert your PCI or PCIe card to the PCI/PCIe slot. Note that there is a joint point on the lower side. Please make sure that the lower edge of your PCI/PCIe card is placed into the joint point.



2. After installing your PCI/PCIe card, you can use the hold-on bars included with the MXC-4000 series to hold your card.



3. Adjust the position of hold-on bar to make it hold you card firmly. And tighten the screw to fix the hold-on bar.

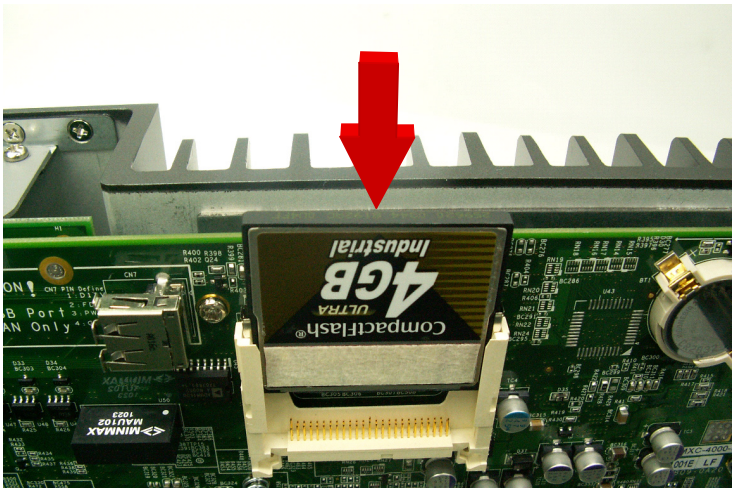


4. Replace the top cover and fasten the thumbscrew.

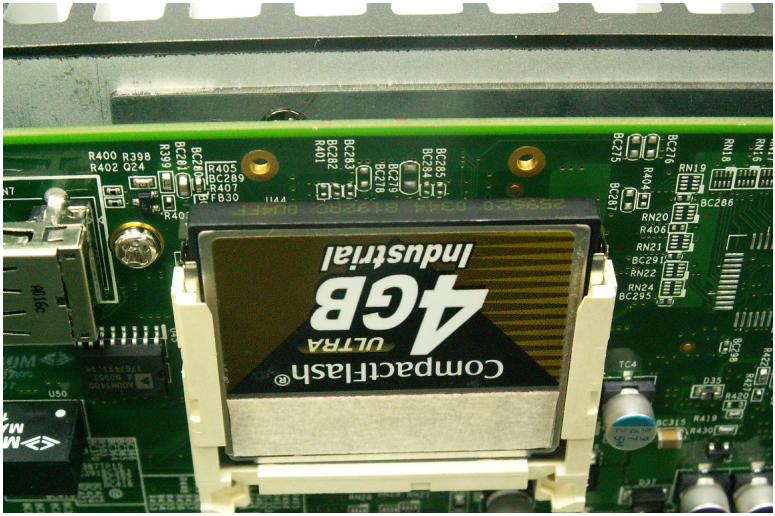
3.3 Installing a CF Card

The MXC-4000 series controller provides an internal Compact-Flash socket to accommodate a CF card as a replacement of hard disk drive. Please follow steps 1-2 in section 3.1 to remove the top cover before installing a CF card.

1. Align your CF card with the guide of CF socket.



2. Gently push your CF card down to make it firmly attached to the internal CF socket.



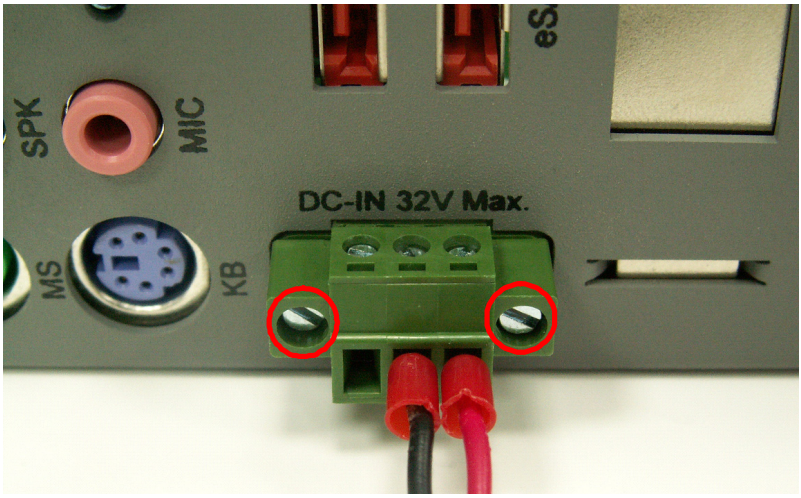
3. Use the spacer supports fromaccessories in the package, to prevent the CF card from coming loose.

4. Replace the top cover and fasten the thumbscrew.

3.4 Plug-in DC power

Note: Before plugging DC power into the MXC-4000 seriescontroller, please make sure you have correct voltage and polarity for your DC input. An improper input voltage or polarity will cause system damage.

The DC power input connector of the MXC-4000 controller consists of three pins, V+, V- , and chassis ground from right to left respectively. The DC power input accepts an input voltage from 9 VDC to 32 VDC. Connect the DC power as shown in the figure showed below. Two screws of the plug should be fastened to prevent the plug from becoming loose.

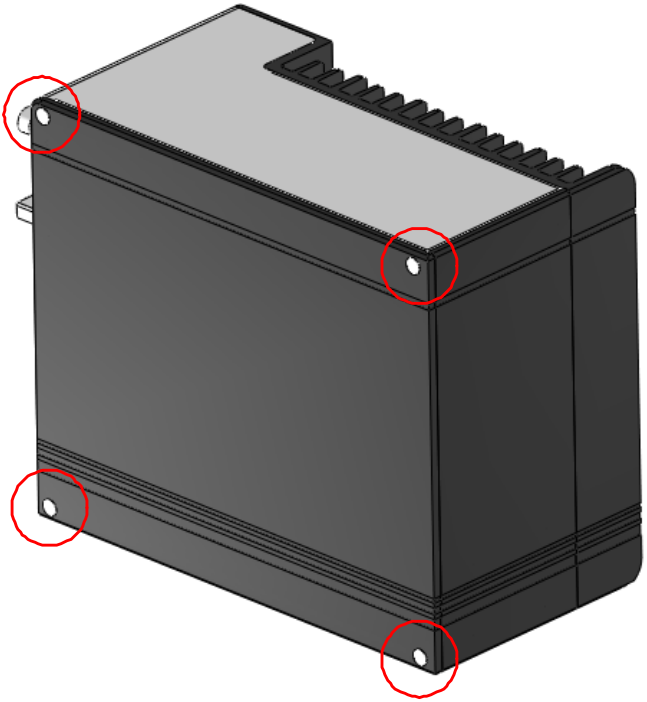


3.5 Mounting MXC4000 Series Controller

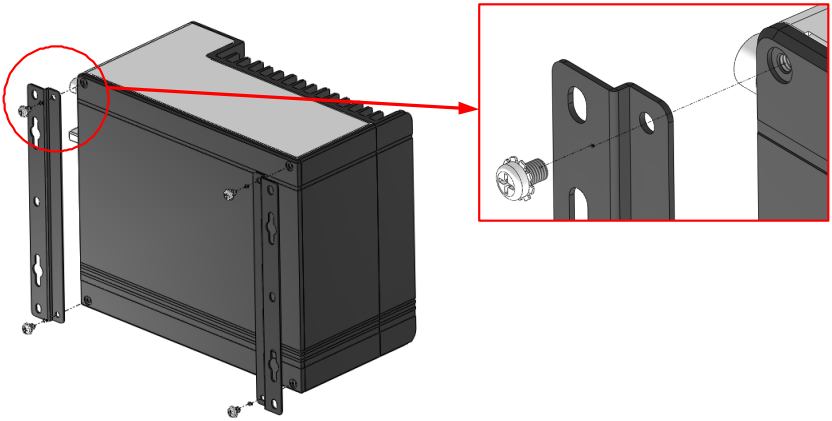
The MXC-4000 series controller is shipped with wall-mount brackets. You can use the wall-mount brackets and accessory screws to mount the MXC-4000 controller on the wall.

The procedures of mounting MXC-4000 series are illustrated step by step below:

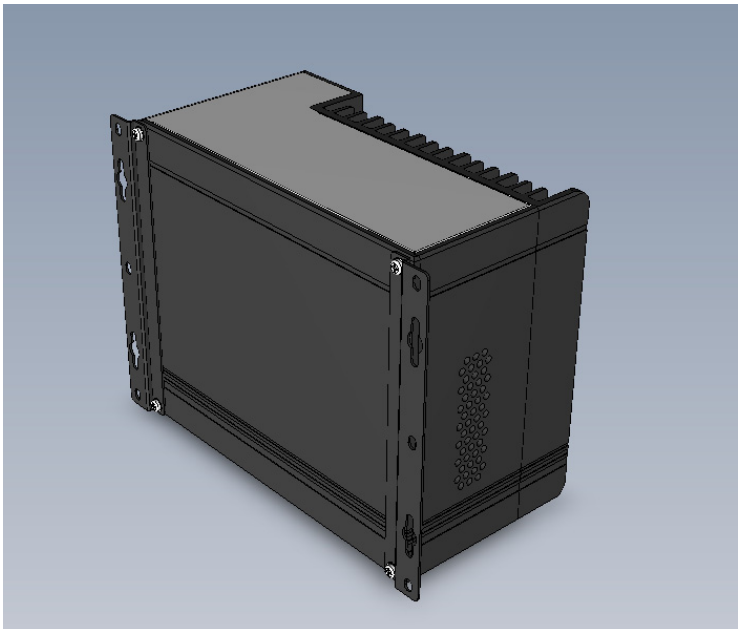
1. Remove four plastic pads in the four corners.



2. You can find two wall-mount brackets and four M4 screws in the accessory box shipped with the controller. Fasten four screws to fix the brackets to the chassis.



3. The final assembly is shown below. You can mount the MXC-4000 controller on the wall via proper screw holes, as shown in the mechanical drawings.



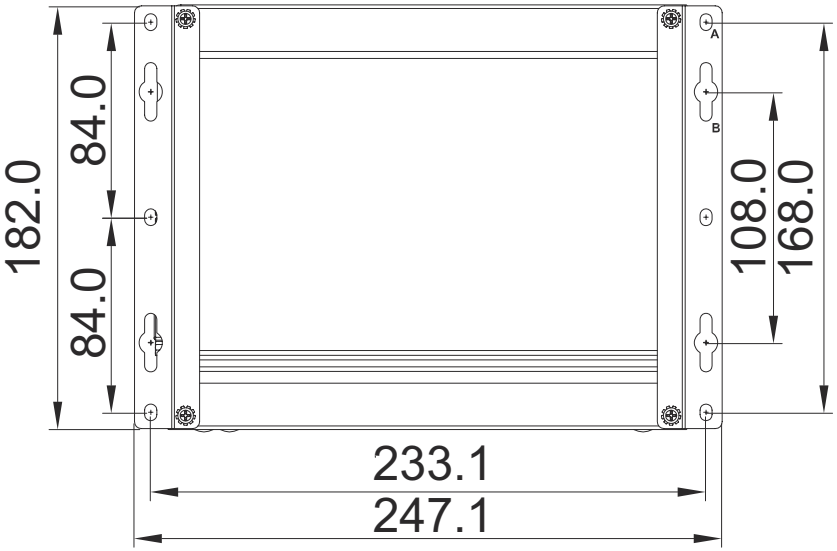


Figure 3-1: Wall-Mount Mechanical Drawing

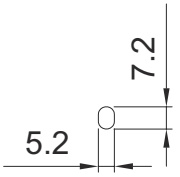


Figure 3-2: Fixed Wall-Mount Hole

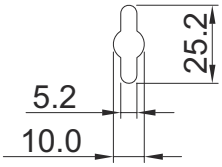


Figure 3-3: Removable Wall-Mount Hole

4 BIOS Settings and Driver Installation

4.1 BIOS Setting

The Basic Input/Output System (BIOS) is a program that provides a basic level of communication between the processor and peripherals. In addition, the BIOS also contains codes for various advanced features applied to the MXC-4000 series controller. The BIOS setup program includes menus for configuring settings and enabling features of MXC-4000 series. Most users do not need to use the BIOS setup program, as the MXC-4000 series controller ships with default settings that work well for most configurations.

In this section, BIOS options are illistrated.

Warning: Changing BIOS settings may lead to incorrect controller behavior and possibly an unbootable controller. If this happens, follow the instructions in Section 2.4.4 to clear CMOS and then restore the default settings. In general, do not change a BIOS setting unless you are absolutely certain of what it does.

4.1.1 Main

4.1.1.1 System Time/System Date

Use this option to specify the system time and date. Highlight System Time or System Date using the up or down <Arrow> keys. Enter new values using the keyboard then press <Enter> key. Press the < Tab > key to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

Note: The time is in 24-hour format. For example, 5:30 A.M. appears as 05:30:00, and 5:30 P.M. as 17:30:00.

4.1.2 Advanced

4.1.2.1 CPU Configuration

Hyper Threading Technology
This option allows you to Enable/Disable Hyper-Threading Technology.

Intel® SpeedStep™ Tech
This option enables or disables Intel SpeedStep technology.

4.1.2.2 IDE Configuration

ATA/IDE Configuration
This option specifies whether the IDE channels should be initialized in Compatible Mode or Enhanced Mode. The settings are Disabled, Compatible and Enhanced. The default option is Compatible.

Configure SATA as
Show this item when select ATA/IDE Configuration to Enhanced. The options are IDE, AHCI and RAID.

Primary IDE Master
Press < Enter > to configure the first device (master) on IDE interface.

Primary IDE Slave
Press < Enter > to configure the second device (slave) on IDE interface.

Secondary IDE Master
Press < Enter > to configure the first device (master) on secondary IDE interface.

Secondary IDE Slave
Press < Enter > to configure the second device (slave) on secondary IDE interface.

Third IDE Master
Press < Enter > to configure the first device (master) on IDE interface.

Third IDE Slave
Press < Enter > to configure the second device (slave) on IDE interface.

4.1.2.3 SuperIO Configuration

Serial Port1/ Port2/ Port3/ Port4 Address
These four options specify the base I/O port address of serial port1 to serial port4.

Note: Do not set the same value for different serial ports to avoid resource conflict.

COM1 Mode/COM2 Mode
Software configure the COM1 and COM2 port mode, options are RS232,RS422 and RS485.

4.1.2.4 Hardware Health Configuration

The hardware health option allows users to monitor hardware status including CPU temperature, system temperature, and system voltages (Vcore, +5V, +3.3V, +12V, +1.8V, 5VSB, VBAT).

4.1.2.5 ACPI Configuration

Suspend Mode
This setting specifies either S1 (POS) or S3 (STR) system suspend mode. The Optimal and Fail-Safe Default setting is S3 (STR).

Option	Description
S1 (POS)	Power On Suspend - Maintain current system status, such as power supply and memory context, except for CPU is not executing instructions. Devices that can wake-up the system can cause CPU to continue execute from where it left off.
S3 (STR)	Suspend to RAM - System enters a low power state instead of completely shut-off. Standby power and power supply for memory are maintained.
Auto	Depends on OS, OS automatically selects suspend mode it supports.

Table 4-1: Suspend Mode

Energy Lake Feature
Enable or disable Intel Energy Lake Feature, Quick resume technology.

USB Device Wakeup From S3/S4
Enable or disable USB Device, typically USB keyboard or USB mouse to wake up system from S3 or S4.

High Performance Event Timer
Enable or disable HPET feature.

4.1.2.6 AHCI Configuration

AHCI BIOS Support
Enable or disable Advanced Host Controller Interface support.

AHCI Port0
Press < Enter > to configure the AHCI Port0 device on AHCI interface.

AHCI Port1
Press < Enter > to configure the AHCI Port1 device on AHCI interface.

AHCI Port2
Press < Enter > to configure the AHCI Port2 device on AHCI interface.

4.1.2.7 USB Configuration

Legacy USB Support
Legacy USB Support also refers to USB mouse and keyboard support. Normally if this option is not enabled, attached USB mouse or keyboard will not be available until a USB compatible operating system fully boots up with USB drivers loaded. With this option enabled, attached USB mouse or keyboard is usable even when no USB drivers loaded.

Option	Description
Disabled	Set this value to prevent the use of any USB device during system boot or in DOS environment.
Enabled	Set this value to allow the use of USB devices during system boot or in DOS environment.
Auto	This option automatically detects USB keyboard or mouse and if found, allows the usage during system boot or in DOS environment.

Table 4-2: Legacy USB Support

USB 2.0 Controller Mode
The USB 2.0 Controller Mode configures the data rate of the USB port. Available options are FullSpeed (12 Mbps) and HiSpeed (480 Mbps).

BIOS EHCI hand-off
This option provides a workaround for OSes without ECHI hand-off support. The change of EHCI ownership should be claimed by the EHCI driver.

USB Mass Storage Device Configuration
This is a submenu for configuring the USB Mass Storage Class Devices which are in use on the USB ports found by BIOS. Emulation Type can be set according to the type of attached USB mass storage device(s). If set to Auto, USB devices less than 530MB will be emulated as Floppy and those greater than 530MB will remain as hard drive. The Forced FDD option can be used to force a hard disk type drive to boot as FDD (Ext. ZIP Drive).

4.1.3 Chipset

4.1.3.1 North Bridge Configuration

DRAM Frequency
Specify DRAM frequency. You can specify whether let BIOS set DRAM frequency automatically or configure it manually (400 MHz or 533 MHz).

Configure DRAM Timing by SPD
Specify Enable to allow the timing setting of DRAM to be configured from SPD or Disable to configure it manually.

Initiate Graphic Adapter
Select which graphics controller to use as the primary boot display device. Support IGD, PCI/IGD.

Internal Graphics Mode Select
Specify the size of system memory used by internal graphics device. 8MB is recommended.

DVMT Mode Select

Dynamic Video Management Technology (DVMT) allows additional system memory to be dynamically allocated in operating system for graphics usage. Once the application is closed, the allocated memory is released and is then available for system usage. DVMT ensures a solid balance between system performance and graphics performance.

Option	Description
Fixed Mode	The graphics driver reserves a fixed portion of the system memory as graphics memory.
DVMT Mode	The graphics driver dynamically allocates system memory for graphics usage, according to system and application demands.

Table 4-3: DVMT Mode Select

Boot Display Device

Select system boot display device, options are VGA or VGA+LVDS. The default option is VGA+LVDS.

Flat Panel Type

Select the display resolution of flat panel, supported options are "800X600" and "1024X768".

4.1.3.2 South Bridge Configuration

USB Function
Specify the number of USB ports enabled in Matrix controller. The default value is 8 USB ports.

USB 2.0 Controller
This option depends on the setting of USB Function. If USB Function is set to Disabled, this option will have no effect. Enabled will open USB 2.0 functionality to all USB ports.

Restore on Power Loss
Determines what state the computer enters when power is restored after a power loss. The options for this value are Last State, Power On and Power Off.

Option	Description
Power Off	The Matrix controller remains off when external DC power is supplied.
Power On	The Matrix controller is turn on when external DC power is supplied. You can specify this option to mimic the AT power behavior, and use an external switch to control the on/off of Matrix controller.
Last State	If encountering a power loss, the Matrix controller resumes to the previous on/off state when external power is normally supplied.

Table 4-4: Restore on Power Loss

4.1.4 Security

The Security setup menu provides both a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.

To uninstall the passwords, you can simply set a NULL password.

Change Supervisor Password
Select **Change Supervisor Password** and press < Enter >. And enter your password in the appearing message box as prompted. The password is stored in NVRAM after setup completes.

User Access Level
This option appears after specifying Supervisor password, and allows you to specify the access level for users.

Option	Description
No Access	Users are not allowed to access the BIOS setting.
View Only	Users are allowed to view BIOS setting but not allowed to change it.
Limited	Users are allowed only to change limited items in BIOS.
Full Access	Users are allowed to access and change all setting items in BIOS.

Table 4-5: User Access Level

Change User Password
Select **Change User Password** and press < Enter >. And enter your password in the appearing message box as prompted. The password is stored in NVRAM after setup completes.

Password Check
This option appears after specifying Supervisor password.

Option	Description
Setup	Check password when entering BIOS setup.
Always	Check password when system booting.

4.1.5 Boot

4.1.5.1 Boot Settings Configuration

Quick Boot

Option	Description
Disabled	Specify BIOS to perform all POST tests.
Enabled	Specify BIOS to skip certain POST test to boot faster.

Quiet Boot

Option	Description
Disabled	Specify BIOS to display POST messages.
Enabled	Specify BIOS to display the OEM logo.

Bootup Num-Lock
Specify whether the Number Lock is on or off after power-on.

Wait for 'F1' If Error
If this option is specified as Disabled, BIOS does not wait for users to press the <F1> key if any error occurs.

Hit 'DEL' Message Display
If this option is specified as Enabled, the system displays the message "Press DEL to run Setup during POST"

Intel 82574L PXE ROM
Disabled/Enabled the Intel 82574L PXE ROM to close/open Intel LAN PXE function.

4.1.5.2 Boot Device Priority

Specify the priority of boot devices. All installed boot devices are detected during POST and displayed on the screen. You can refer to the following steps to specify different boot device.

Boot from a SATA hard drive

1. Select **Hard Disk Drives** and press Enter.
2. Your SATA hard drive is displayed with its identification string. Specify it as **1st Drive**.
3. Go back to upper level and select your SATA hard drive in **1st Boot Device**.

Boot from CF card

1. Select **Hard Disk Drives** and press Enter.
2. Your CF card is displayed with its identification string. Specify it as **1st Drive**.
3. Go back to upper level and select your CF card in **1st Boot Device**.

Boot from USB CD/DVD drive

1. Select **USB Drives** and press Enter.
2. Your CD/DVD drive is displayed with its identification string. Specify it as **1st Drive**.
3. Go back to upper level and select your CD/DVD drive in **1st Boot Device**.

Boot from USB Flash disk

1. Select **USB Drives** and press Enter.
2. Your USB flash disk is displayed with its identification string. Specify it as **1st Drive**.
3. Go back to upper level and select your USB flash disk in **1st Boot Device**.

4.1.6 Exit

Save Changes and Exit
When you finish BIOS setting, please select this option to save all changes and reboot the system to make new setting takes effect.

Discard Changes and Exit
Select this option to discard all changes and exit BIOS setup..

Discard Changes
Select this option to discard all changes without exiting BIOS setup..

Load Optimal Defaults
Select this option to set all BIOS options to a complete set of default setting. The Optimal setting is designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Setup options if your computer encounters system configuration problems.

Load Failsafe Defaults
Select this option to set all BIOS options to a complete set of default setting. The Failsafe setting is designed for maximum system stability, but not maximum performance. Select the Fail-Safe Setup options if your computer encounters system configuration problems.

4.2 Driver Installation

After installing the operating system, you need to install all related drivers to make your system work accordingly. This section describes the drivers needed for Windows operating systems and the procedures to install them. For other OS support, please contact ADLINK for further information.

To install Windows drivers, please follow the steps below:

1. Properly install Windows before installing any drivers. Most of the standard I/O device drivers have been included in Windows.
2. Install the chipset driver.
3. Install the graphics driver.
4. Install the Ethernet driver.
5. Install the audio driver.
6. Install the WDT (watchdog timer) driver.

4.2.1 Install the Chipset Driver

This section describes the procedure to install the chipset driver of MXC-4000 series. The chipset driver outlines to the operating system how to configure the Intel® D150 chipset components in order to ensure that the following features function properly:

- Core PCI and ISAPNP Services
- IDE/ATA33/ATA66/ATA100 Storage Support
- PCIe Support
- SATA Storage Support
- USB Support
- Identification of Intel® Chipset Components in the Device Manager

One of the following operating systems must be fully installed and running on the system before installing this software:

- Microsoft Windows* Server 2003
- Microsoft Windows Server 2003 x64 Edition*
- Microsoft Windows Server 2008
- Microsoft Windows Server 2008 x64
- Microsoft Windows XP
- Microsoft Windows XP Professional x64
- Microsoft Windows 2000
- Microsoft Windows Vista
- Microsoft Windows Vista x64
- Microsoft Windows 7
- Microsoft Windows 7 x64
- Microsoft Windows 2008 R2
- Microsoft Windows 2008 R2 x64

Please follow the following steps to install the chipset driver for the MXC-4000 series:

1. Close any running application.
2. Insert the ADLINK All-in-One DVD. The chipset driver is located in the directory:
   x:\Driver Installation\Matrix\MXC-4000\Chipset\
   where x: denotes the DVD-ROM drive.
3. Execute Setup.exe and follow on-screen instructions to complete the setup.
4. After installation completes, reboot your system.

4.2.2 Install the Graphics Driver

This section describes the procedure to install the graphics driver of MXC-4000 series. The MXC-4000 series is equipped with Intel® 3150 graphics media accelerator integrated in Intel Mobile Intel® D510 chipset. The Intel® Graphics Media Accelerator Driver package supports the following operating systems:

- Windows 2000
- Windows XP.

Please follow the following steps to install graphics driver.

1. Close any running application.
2. Insert the ADLINK All-in-One DVD. The chipset driver is located in the directory:
   x:\Driver Installation\Matrix\MXC-4000\Graphics\
   where x: denotes the DVD-ROM drive.
3. Execute Setup.exe and follow on-screen instructions to complete the setup.
4. After installation completes, reboot your system.

4.2.3 Install the Ethernet Driver

This section describes the procedure to install the Ethernet driver of MXC-4000 series. Please follow the steps to install the driver for Intel WG82574L Gigabit Ethernet controller.

For Windows 2000 and XP users:

1. Close any running application.
2. Insert the ADLINK All-in-One DVD. The chipset driver is located in the directory:
   x:\Driver Installation\Matrix\MXC-4000\LAN-Intel\
   where x: denotes the DVD-ROM drive.
3. Execute setup.exe and follow on-screen instructions to complete the setup.
4. After installation completes, reboot your system.

4.2.4 Install the Audio Driver

This section describes the procedure to install the audio driver of MXC-4000 series. The MXC-4000 series controller supports Intel High Definition audio using Realtek ALC262 audio codec. Please follow the steps to install audio driver for MXC-4000 series controller.

For Windows 2000, XP and Vista users:

1. Close any running application.
2. Insert the ADLINK All-in-One DVD. The chipset driver is located in the directory:
   x:\Driver Installation\Matrix\MXC-4000\Audio\
   where x: denotes the DVD-ROM drive.
3. Execute Setup.exe and follow on-screen instructions to complete the setup.
4. After installation completes, reboot your system.

4.2.5 Install the WDT Driver

A WDT (watchdog timer) is a hardware mechanism to reset the system when the operating system or application is halted. A typical usage of WDT is to start the timers and periodically reset the timer, and when timer is expired, the system resets. You need to install the WDT driver to program the WDT.

Please follow the following steps to install WDT driver for theMXC-4000 series

1. Close any running application.
2. Insert the ADLINK All-in-One DVD. The WDT driver is located in the directory:
   x:\Driver Installation\Matrix\MXC-4000\WDT\
   where x: denotes the DVD-ROM drive.
3. Execute setup.exe and follow on-screen instructions to complete the setup.
4. After installation completes, reboot your system.

A Appendix

A.1 Watchdog Timer (WDT) Function Reference

This appendix describes the usage of the watchdog timer (WDT) function library for the MXC-4000 controller. The watchdog timer is a hardware mechanism to reset the system in case the operating system or an application halts. After starting watchdog timer, you need to periodically reset the watchdog timer in the application before the timer expires. Once watchdog timer expires, a hardware-generated signal is sent to reset the system.

To use the WDT function library with the MXC-4000 series, you need to include the header file WDT.h and linkage library WDT.lib in your C++ project.

InitWDT

@ Description

Initialize the watchdog timer function of MXC-4000 series controller. InitWDT must be called before the invocation of any other WDT function.

@ Supported controllers

MXC-4000 series

@ Syntax

C/C++

```
BOOL InitWDT()
```

@ Parameters

None

@ Return code

TRUE if watchdog timer is successfully initialized.

FALSE if watchdog timer is failed to initialize.

SetWDT

@ Description

Set the timeout value of watchdog timer. There are two parameters for this function to indicate the timeout ticks and unit. Users should call ResetWDT or StopWDT before the expiration of watchdog timer, or the system will be reset.

@ Supported controllers

MXC-4000 series

@ Syntax

C/C++

```
BOOL SetWDT(BYTE tick, BYTE unit)
```

@ Parameters

tick

Specify the number of tick for watchdog timer. A valid value is 1 - 255.

unit

Specify the timeout ticks of the watchdog timer.

Value	Description
0	The unit of tick is second. For example, when you specify tick as 100 and unit as 0, the timeout value is 100 seconds.
1	The unit of tick is minute. For example, when you specify tick as 100 and unit as 1, the timeout value is 100 minutes.

@ Return codes

TRUE if timeout value of watchdog timer is successfully set.

FALSE if timeout value of watchdog timer is failed to set.

StartWDT

@ Description

Start the watchdog timer function. Once the StartWDT is invoked, the countdown of watchdog timer starts. Users should call ResetWDT or StopWDT before the expiration of watchdog timer, or the system will be reset.

@ Supported controllers

MXC-4000 series

@ Syntax

C/C++

```
BOOL StartWDT()
```

@ Parameters

None

@ Return codes

TRUE if watchdog timer is successfully started.

FALSE if watchdog timer is failed to start.

ResetWDT

@ Description

Reset the watchdog timer. The invocation of ResetWDT allows users to restore the watchdog timer to the initial timeout value specified in SetWDT function. Users should call ResetWDT or StopWDT before the expiration of watchdog timer, or the system will be reset.

@ Supported controllers

MXC-4000 series

@ Syntax

C/C++

```
BOOL ResetWDT()
```

@ Parameters

None

@ Return codes

TRUE if watchdog timer is successfully reset.

FALSE if watchdog timer is failed to reset.

StopWDT

@ Description

Stop the watchdog timer.

@ Supported controllers

MXC-4000 series

@ Syntax

C/C++

```
BOOL StopWDT()
```

@ Parameters

None

@ Return codes

TRUE if watchdog timer is successfully stopped.

FALSE if watchdog timer is failed to stop.